

## *Quality improvement report*

### Effect of a formal education programme on safety of transfusions

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#### Abstract

**Problem** Failure of correct identification and insufficient monitoring of patients receiving transfusions continue to be appreciable and avoidable causes of morbidity and mortality.

**Design** A study by a regional transfusion service and a transfusion nurse specialist of the effects of an education programme based on the current national guidelines on identification and monitoring of patients receiving transfusions.

**Setting** A large United Kingdom teaching hospital which houses the headquarters of the regional transfusion service.

**Key measures for improvement** Improvement in compliance with published national guidelines on the prescription and administration of blood transfusions.

**Strategy for change** An audit of current compliance followed by dissemination by a transfusion nurse specialist of a clinical skills package (based on the best practice for transfusion) to all staff involved in giving transfusions. This was supported by trained instructors and the display of standard operating procedures for transfusion in all clinical areas.

**Effect of change** An improvement in compliance with the national guidelines to over 95% in six out of seven of the recommendations on best practice was seen 18 months after the initial intervention.

**Lessons learnt** The study shows that education of those who prescribe and administer transfusions, as recommended by bodies concerned with the hazards of transfusion, can improve the safety of transfusions.

#### Background

Mistakes in transfusing blood remain an important cause of morbidity and mortality. In 2001, the serious hazards of transfusion (SHOT) scheme, which receives reports of adverse transfusion events from the majority of United Kingdom hospitals, reported that failure in some aspect of bedside identification of the patient, the blood, or the blood component, or of the monitoring of the patient throughout the transfusion, has been the single most important cause of errors in transfusions for four consecutive years.<sup>1</sup> Transfusion errors occur in most hospitals, possibly because those who are only intermittently involved in the prescription and administration of blood and blood products may be less

aware of the potential hazards than are haematologists and specialist transfusion staff. As these errors may be potentially fatal and are preventable, both the serious hazards of transfusion (SHOT) report<sup>1</sup> and guidelines on the administration of blood issued by the British Committee for Standards in Haematology (BCSH)<sup>2</sup> recommend training staff involved in transfusions in order to minimise these errors.

We studied existing practices for identifying patients for transfusion and for intratransfusion monitoring of patients in a large teaching hospital to determine whether there was a definite failure to achieve the standards recommended by the British committee.<sup>2</sup> At that time, there was no formal education programme for medical staff responsible for prescribing and administering blood and blood products.

#### Principal objective

Our principal objective was to determine whether a training programme for staff, as recommended by the two bodies,<sup>1,2</sup> would result in an improvement in identification and monitoring of patients for transfusion. A formal education programme was devised, implemented, and evaluated; a recently appointed transfusion nurse specialist was the link between the regional transfusion service, those already involved in nurse education, and those involved in transfusions at ward level.

#### Key measures for improvement

The published guidelines<sup>2</sup> detail the methods of identification required for patients receiving a transfusion and outline the requirements for monitoring them during the transfusion. The guidelines recommend that:

- The patient's identity should be verified by two members of staff together
- The identification should be carried out at the patient's bedside
- The identity and quality of the blood pack and the prescription should be formally verified
- The patient's identity should be confirmed verbally
- The patient's identity band should be formally verified
- The patient's blood pressure, pulse, and temperature should be taken before and at regular intervals during the transfusion (as detailed in the committee's report.<sup>2</sup>)

## Effect of education on compliance with guidelines at transfusion

	Correct procedures		Compliance			
	Before education (n=148)	After education (n=166)	% before education	% after education	% improvement	P value*
Identity checked by two people	148	166	100	100	0	>0.05
Identity checked at bedside	93	166	63	100	37	<0.0001
Verification of component and prescription	147	166	99	100	1	>0.05
Verbal identification of patient	53†	119†	46	98	52	<0.0001
Verification of identity band	89	160	60	96	36	<0.0001
Baseline observations made	61	153	41	92	51	<0.0001
Regular observations made during transfusion	54‡	208‡	25	65	40	<0.0001

\*Fisher's exact test.

†Total observations=114 before education and 122 after education.

‡Total observations=218 before education and 319 after education.

## Compliance with guidelines

Before the education programme was introduced, we identified from the transfusion centre's computer records eight wards in which red cell transfusions were given frequently. We analysed the ward case records and transfusion centre records of all patients in these wards who received such a transfusion during an observation period of one month and recorded how well the recommendations were observed.

It was evident that the nursing staff were observing the guidelines' requirements for verification of the identity of the blood or blood component and of the prescription (table). They were, however, carrying this out at the bedside in only 63% of cases. Patients' identities were verified verbally in 46% of cases and patients' identity bands in 60%. Baseline observations of vital signs were made in 41% of patients, but vital signs were recorded regularly in only 25%.

Widespread ignorance of the current guidelines was discovered when the nursing staff's knowledge was assessed by the nurse specialist after the audit. We concluded that an education programme to increase the awareness of the current guidelines on identification and monitoring might improve the safety of transfusions in the hospital.

## Strategy for change

A "clinical skills" education package,<sup>3</sup> based on the best practice defined in *The Handbook of Transfusion Medicine*<sup>4</sup> and the British committee's guidelines,<sup>2</sup> was supplied in 2000 to all nursing staff involved in giving transfusions in Ninewells Hospital. The education package set out the five identification procedures required by the guidelines (above) for patients about to receive a transfusion and outlined the requirements for monitoring of vital signs both before and during transfusions. In particular, it recommended that two people should, together and near the patient, verify the identity of the patient, and that of the blood component and the prescription. A schedule for monitoring of vital signs before and during the transfusion was also recommended.<sup>2</sup>

The education package was developed by the hospital's nurse educators, the transfusion nurse specialist, and the medical staff of the transfusion service. To reinforce the package, standard operating procedures for giving transfusions were displayed in all clinical areas where transfusions are given.

Study days on clinical skills were developed and attended by a senior nurse from each ward. The results

of the initial audit were presented, in the context of the national guidelines,<sup>1,2</sup> and the theory behind blood groups and transfusion reactions was outlined. Transfusion theory and best practice were outlined in a lecture, and within the first three months of the programme the majority of senior nurses were provided with a self directed ("self taught") clinical skills package on the theory and safety of giving transfusions. After attending this lecture and working through the self directed package, the senior nurses acted as instructors/assessors for other members of staff in their wards. They formally assessed the knowledge of the nursing staff after completion of the self directed package and confirmed their suitability to give transfusions safely. Although these senior nurses did not give any further formal training, they were intended to act as continuing sources of reference in their areas.

## The effect of changes

Eighteen months after the start of the education programme, a repeat audit was undertaken in the same clinical areas to determine what effect there had been on the quality of identification and monitoring before and during the transfusion. The table shows that there was over 95% compliance with all the guidelines' requirements for identification of patients and blood components, though monitoring of vital signs before and during transfusions was still inadequate.

## Next steps

In the current study, an appreciable failure to comply with the best practice in the administration and monitoring of transfusions was evident before a nurse education programme was started. In this programme, education was augmented by nursing instructors (trained by the local department of transfusion medicine) and by the display of standard operating procedures for transfusion in all clinical areas. The programme resulted in noticeable improvement, as similar packages in other clinical fields have done,<sup>5,6</sup> in all requirements for patient identification which had previously been unsatisfactory. The continuing failure to monitor vital signs properly is not easily explained, though it is of interest that most failures in this respect occurred with transfusions at night, after 10 pm. Early recognition of a haemolytic transfusion reaction is essential, as the prognosis depends on the number of cells transfused. We are now undertaking further education and training on this aspect.

**Key learning point**

Training of medical staff involved in the giving of transfusions by transfusion service staff can improve compliance with guidelines on identification and monitoring of patients receiving transfusions

**Conclusions**

Dissemination of best practices to those who administer blood by those who crossmatch and provide it is successful in promoting safe transfusion practice. Such education programmes are an effective strategy to reduce the risks associated with transfusion. Success may be enhanced by employing a nurse solely for transfusion support. We do not know how long the effect of the current intervention will last but we anticipate that the nurse instructors in each clinical area will have a continuing effect. We intend to carry out a further audit in due course to determine if and when further interventions are required to maintain the current high compliance with published guidelines.

PC carried out the collation of data and the statistical analysis. IR assisted in the development of the project and the educational material and carried out the audit work and teaching. SR conceived and directed the local implementation of the project. All three authors cooperated in the preparation of the manuscript.

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## Navigating across medicine's electronic landscape, stopping at places with Pub or Central in their names

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Attempts to use the internet to free up access to the world's biomedical literature have resulted in several similarly named initiatives emerging over the past two years. PubMed Central, BioMed Central, and the Public Library of Science have joined the slightly older PubMed, which has a different function but a name similar enough to add to the confusion.

The debates around free access are some of the most important that have taken place in the three centuries of scientific publishing.<sup>1</sup> Yet confusion about who wants to do what to whom is hampering this debate. This attempt to dispel some of the confusion was up to date at the time of writing, but given the speed at which medicine's electronic landscape is changing, it is likely to date fast.

**PubMed**

PubMed provides access via the world wide web to over 11 million Medline citations dating from the mid-1960s to the present. It covers 4300 journals devoted to medicine, nursing, dentistry, veterinary medicine, healthcare systems, and the preclinical sciences. PubMed also provides access to life science journals that are not indexed by Medline but have submitted their full text to PubMed Central (see below).

As well as providing access to these abstracts and citations, PubMed links to more than 2000 websites that provide full text articles (figure). Access to these full text articles usually entails registration, subscription fees, or some other form of payment, although *bmj.com* is free.

**Summary points**

Several initiatives have recently emerged to provide free access to biomedical literature though the internet

Traditional publishers have been reluctant to join these initiatives because of fears about lost subscriptions

PubMed Central's "decentralised model" could be the trigger for greater publisher participation

The advent of free electronic journals—paid for by authors' charges—could profoundly change the publishing landscape

In the four years since PubMed was launched as Medline's web interface, it has become the starting point for literature searches for most medical researchers. Over one million searches are conducted through PubMed each working day. A service provided by the US National Library of Medicine, PubMed is paid for by the US taxpayers.

**Decisions for authors**

In terms of exposure, publishing original biomedical research in a journal not indexed in PubMed is akin to sealing a manuscript in a bottle and launching it on the tide. For authors, it's publish in a journal indexed by PubMed or perish.